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(54) Hinge with spring for furniture

(57) A furniture hinge comprising an arm (1) for fastening to a piece of furniture (4) and a part (7) for fastening to a door (11), where said items are joined by two rockers (5, 6) to form an articulated quadrilateral that allows rotation; and a V-shaped spring (8), placed near an end of a rocker (6), with an arm (8') of the spring resting on the arm (1) and the second arm (8") of the spring resting on a protrusion or cam of the rocker (5) to create a lever arm that compresses the spring (8) producing a moment in the opening or closing direction of the door (11), depending on the shape the protrusion (9', 9", 9"') found on the rocker (5).

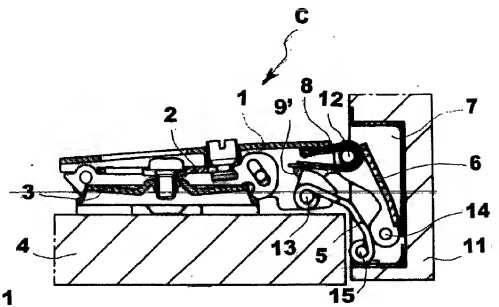

Fig. 1

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Description

Technical Field

[0001] This invention relates to a hinge with spring for doors or, more in general, for furniture elements that can be opened and closed. More particularly, it relates to a hinge equipped with a spring that exerts a pushing force during closing or opening.

Background Art

[0002] Pieces of furniture housing storage spaces are often equipped with doors or leaves that open and close by rotating around a horizontal or vertical axis using a hinge mechanism. A very common system, which is widely used in the furniture industry, is provided with hinges for supporting the doors in the closed position that are hidden when the door of the piece of furniture is closed.

[0003] Patents US-A-3362042 and US-A-4226001, for example, describe these types of hinges in detail. The hinges described in these documents have several advantages that have determined their popularity and widespread use on the market. The described alternative versions use different types of springs in the hinge to produce a biasing force when the door to which they are attached is closed. Consequently, the doors on the piece of furniture close in a facilitated and very precise manner. Unfortunately, in these cases it is almost always necessary to exert an additional external force to open the door of the piece of furniture, which entails the availability of some type of handle. Sometimes, doors with handles or other outwardly visible gripping devices are not desirable. Therefore, a device with a spring that generates an opening moment on the door must be used to open the door. To accomplish this, the spring must be separate from the hinges, or highly complex hinges are required.

Summary of the Invention

[0004] It is a main object of this invention to provide a hinge that is versatile and inexpensive in manufacture, using as many standard hinge parts as possible.

[0005] This object is achieved by means of a hinge with spring in accordance with claim 1.

[0006] Thanks to its features, the hinge of the invention is versatile because it can be made in different versions suitable for different types of applications. Nearly all components that make up the hinge are kept in the same shape and by replacing only one part: a rocker, a hinge with a pushing force during closing can be transformed into a hinge with a pushing force during opening. The dependent claims describe preferred embodiments of the invention.

Brief Description of the Drawings

[0007] These and other advantages and properties of the invention shall become apparent from the detailed description of preferred embodiments of a hinge, given by way of non-limiting examples and in conjunction with the following appended drawings:

Figures 1, 2, 3 show a section of the hinge of the invention in three different opening positions of a door of a piece of furniture;
Figures 4, 5, 6 show sections of a further embodiment of the hinge in accordance with the invention in three different opening positions of a door of a piece of furniture;
Fig. 7 shows a section of an element of the hinge of the invention;
Fig. 8 shows a side view of the element of Fig. 7;
Fig. 9 shows a view of an element of the hinge in accordance with the invention;
Fig. 10 shows a side view of the element displayed in Fig. 9;
Fig. 11 shows a sectional view of the elements of Figures 7 and 9 in the assembled position;
Fig. 12 shows a view of an element of the hinge in accordance with the invention;
Fig. 13 shows a side view of the element of Fig. 12;
Fig. 14 shows a sectional view of the elements of Figures 7 and 12 in the assembled position;
Fig. 15 shows a view of an alternative embodiment of an element of the hinge in accordance with the invention;
Fig. 16 shows a side view of the element of Fig. 15;
Figures 17, 18, 19 show sections of another embodiment of a hinge in accordance with the invention in three different opening positions of a door of a piece of furniture.

Description of the Invention

[0008] With reference to the above figures, what follows is a detailed description of preferred embodiments of a hinge, globally referred to with "C". The hinge comprises a fixed part, or arm (1), that can be attached to a base, or plate (3), integrally fixed to a supporting wall (4), which can be the side or any appropriate part of a piece of furniture. The hinge (C) comprises arm-fastening and adjusting parts so that the arm can be adjusted in the three orthogonal directions. A plate (2) is used to adjust the position of the hinge in the frontal and side directions with respect to the piece of furniture; whereas the means for adjusting the position of the hinge in the other orthogonal direction are not shown in detail in the Figures, since these are means known in the art.

[0009] Two rockers 5, 6 are provided; having a respective first end pivoting around two respective pins 12, 13 housed in holes in the side walls of the arm 1. The arm 1 is linked to a box element 7, fixed to a cavity

made on the internal wall of the door 11 or of any other appropriate pivoting part of the piece of furniture. The two respective second extremities of the rockers 5, 6 are housed in other two respective pins 14, 15 having axes parallel to the first two pins 12, 13. The four pins 12, 13, 14, 15 form a four-bar linkage. A V-shaped spring 8 is placed around a pin 12 integral to the arm 1. One arm 8' of the spring rests on the back of the arm 1; the second arm 8" rests on a protrusion 9 of the rocker 5 housed in the other pin integral with the arm 1, so as to form a lever arm.

[0010] The position and the shape of the protrusion 9', 9", 9"' is chosen so as to produce a moment on the rocker 5 during the door-opening or closing pivoting. This reaction to this moment is sufficient to push the pivoting part 7 toward the open position - this version is shown in figures 1 to 3 and 17 to 19 - or toward the closed position - this version is shown in figures 4 to 6 - or is such that it does not produce any pushing force.

[0011] In a first advantageous embodiment of the invention, the rocker 5 consists of at least one part of shaped sheet metal 10 to which an insert 9' or 9" made of plastic or other suitable material is anchored; this insert is appropriately shaped, in the part that rests on the spring 8, in the shape of a cam. In this way, different types of cams or cams with different profiles can be fixed to the shaped part 10, allowing the hinge to acquire different functions: for example, using the same spring to produce a pushing force both when closing the door and when opening the door.

[0012] Figures 1 to 3 show an embodiment of the rocker 5 wherein the spring produces a pushing force on the door 11 during opening. In this case, the rocker is joined to a cam 9' having such a shape to generate, when an appropriate point of a spring arm 8" is pressed, a pushing force that, for example, suffices to open the door by rotating it clockwise approximately 8° - 10° with reference to the figures. The door can be equipped with, for example, some type of retainer. Possible retainers include spring, magnetic, or hook types that keep the door closed. When released from the retainer, the pushing force causes the door to open at an angle predetermined by the profile of the cam 9'. Due to the particular way in which the cam 9' is made, the spring has no effect whatsoever on the remainder of the door-opening rotation.

[0013] Figures 4 to 6 show an embodiment of the hinge providing a profile for cam 9", placed on the rocker 5, that makes the spring 8 to produce a pushing force on the door 11 during closing, counterclockwise with reference to the Figures, starting with a slightly open door at an angle between 15° and 20°. Due to the particular profile of cam 9", the spring has no effect whatsoever on the remainder of the door-opening pivoting.

[0014] The different embodiments of the rocker 5, consisting of the shaped part 10 and the cams 9' and 9", are shown in more detail in Figures 7 to 14.

[0015] Another embodiment of the hinge in accordance with the invention comprises the rocker 5 shown in Figures 15 and 16. The rocker 5 is made in a single piece consisting of shaped sheet metal. Instead of the cam, this version comprises a tongue 9"' that protrudes from the back of the rocker 5. When the hinge is in the assembled position, the tongue 9"' pushes against an arm of the spring 8 and carries out the same functions as the previously discussed cams 9' or 9", depending on the shape of the tongue. In the example shown in Figures 17 to 19, the tongue of the rocker is shaped to carry out the same function as the cam 9' shown in Figures 1 to 3. The advantage of this version is that it saves time and money thanks to its low production cost and eliminates one assembly step.

[0016] The rocker made as described above gives the hinge greater versatility. Its low production cost decreases the cost of the hinges, allowing economies of scale.

[0017] The particular embodiments described here do not limit the scope of this patent application, which covers all the embodiments of the invention defined in the claims.

Claims

1. A furniture hinge comprising

   a fixing arm (1) for fixing to a piece of furniture (4),
   an element (7) for fixing to a door (11),
   a first (6) and a second (5) rocker forming a four-bar linkage and connecting the fixing arm (1) to the element (7) so as to enable a reciprocal pivoting,
   a V-shaped spring (8) having first and second arms (8', 8"), placed around a pin (12) near an end of the first rocker (6), wherein the first arm (8') of the spring (8) rests on the arm (1) and the second arm (8") rests on a protrusion (9") of the second rocker (5) whereby a lever arm is created adapted to compress the V-shaped spring (8) and to produce a moment generating a pushing force in the closing direction of the door (11), **characterized by** the fact that the second rocker (5) with said protrusion (9') is replaced with another rocker (5) having a differently shaped protrusion (9', 9") adapted to compress the V-shaped spring (8), thus producing moments that apply on the hinge different pushing forces, for one same hinge position.

2. A hinge as claimed in claim 1 wherein said protrusion (9', 9") of the second rocker (5) is suitable for compressing the spring (8) during said reciprocal rotation, producing a moment causing a pushing force in the door-opening direction.

3. A hinge as claimed in claim 2 wherein said protru-

sion (9', 9") compresses the spring only for a short segment of said reciprocal rotation, corresponding to the last door-closing segment.

4. A hinge as claimed in claim 3 wherein said protrusion (9', 9") is a plastic cam fixed to a shaped metal element and jointly forming the second rocker (5).

5. A hinge as claimed in claim 1 wherein said protrusion (9"') is a shaped tongue integral to the structure of the second rocker (5).

6. A hinge as claimed in claim 1 wherein said protrusion (9"') is made by means of molding the second rocker (5).

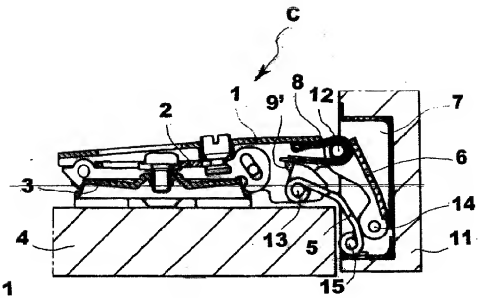

Fig. 1

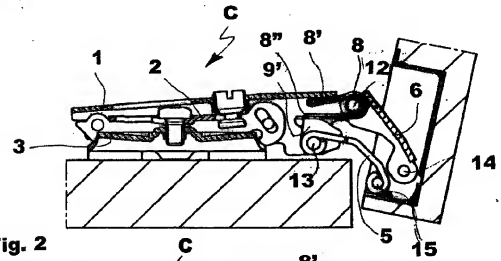

Fig. 2

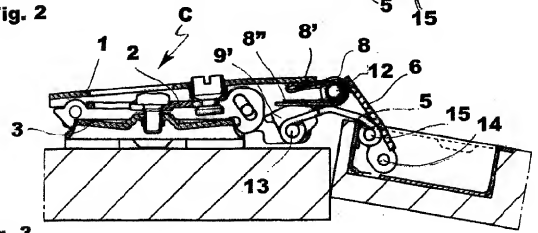

Fig. 3

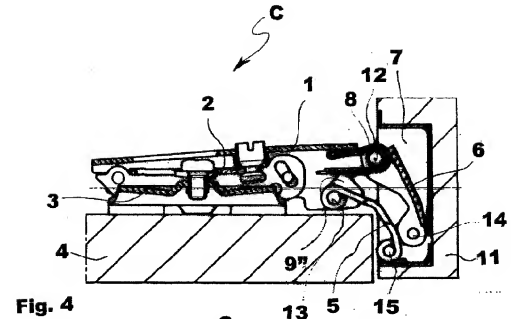

Fig. 4

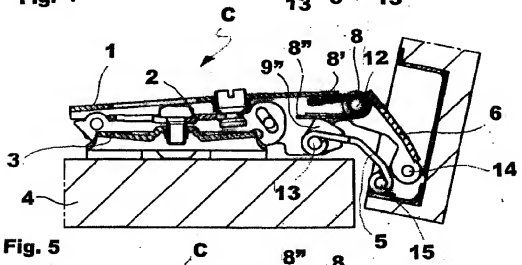

Fig. 5

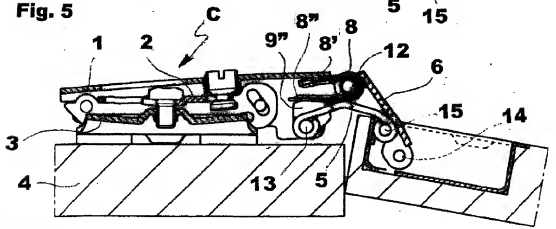

Fig. 6

Fig. 7

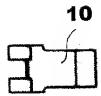

Fig. 8

Fig. 9

Fig. 10

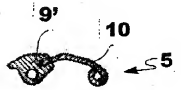

Fig. 11

Fig. 12

Fig. 13

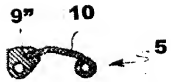

Fig. 14

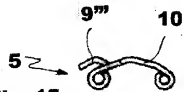

Fig. 15

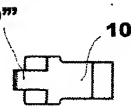

Fig. 16

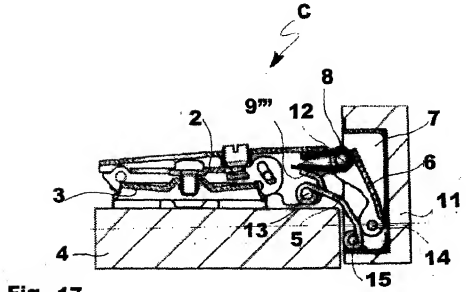

Fig. 17

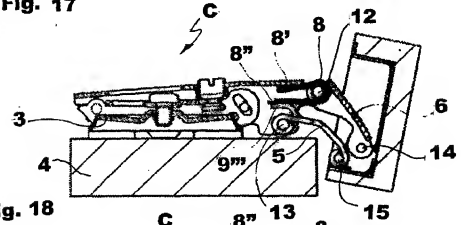

Fig. 18

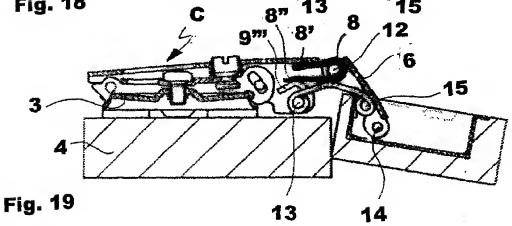

Fig. 19

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 10 2103

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 6 401 298 B1 (LENZ GUENTER) 11 June 2002 (2002-06-11) * column 1, line 4 - line 24 * * column 2, line 18 - line 28 * * figures 2,3,5,6 * -----	1-6	E05D11/10
X	US 4 112 543 A (MAGES BERNHARD ET AL) 12 September 1978 (1978-09-12) * column 1, line 6 - line 25 * * column 1, line 48 - line 50 * * column 2, line 34 - column 3, line 21 * * column 3, line 16 - line 21 * * figures 1,2 * -----	1-4,6	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7) E05D E05F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 August 2004	Mund, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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This annex lists the patent family membersrelating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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02-08-2004

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